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STUDENT LEARNING FROM TELEVISED MATERIALS IN TRADITIONAL CLASSROOMS EQUIPPED WITH MONITORS COMPARED WITH THAT IN A THEATRE FACILITY SIMILARLY EQUIPPED.

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GOALS OF THIS EXPERIMENT WERE TO GATHER COMPARATIVE DATA ON STUDENT ACHIEVEMENT IN TWO CLASSROOM ENVIRONMENTS, STUDENT AND FACULTY ATTITUDES, AND PERSONNEL AND TECHNICAL COSTS. CHI SQUARE ANALYSIS OF FINAL EXAMINATION SCORES SHOWED THAT THE CLASSROOM GROUP LEARNED SIGNIFICANTLY MORE THAN THE THEATER GROUP, BUT THE DISTRIBUTION OF COURSE GRADES DID NOT SUPPORT THIS. EACH STUDENT GROUP PREFERRED ITS USUAL ENVIRONMENT, BUT TEACHERS HAD A SLIGHT PREFERENCE FOR THE CLASSROOM. CLOSED CIRCUIT TV TEACHING REQUIRED LESS EXPENDITURE OF BOTH FACULTY RESOURCES AND TECHNICAL EFFORT. (LH)

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FINAL REPORT

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STUDENT LEARNING FROM TELEVISED MATERIALS IN TRADITIONAL
CLASSROOMS EQUIPPED WITH MONITORS COMPARED WITH THAT IN
A THEATRE FACILITY SIMILARLY EQUIPPED.

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OBJECTIVES

This research aimed to investigate the suitability of a cinema theatre as a viewing room for televised courses. The broader objective was that of discovering whether or not the Varsity Theatre adjacent to Marquette University campus offered a feasible solution to the shortage of classroom space, and possibly to suggest that similar facilities offered a solution to the same problem in other places.

- (1) It aimed first and primarily to compare student learning from televised lessons in the theatre with that in the classrooms as well as overall student achievement in the course in the two situations. This was considered Problem 1, for which the findings are reported under that heading.
- (2) It aimed also to get some preliminary data on student attitudes and preferences in the two situations. These activities and results are reported as Problem 2.
- (3) It aimed to assess faculty attitudes and reactions in the two situations. These activities and results are reported as Problem 3.
- (4) It aimed to gather some preliminary data on relative expenditures of faculty resources. These are reported as Problem 4.
- (5) It aimed to compare the relative technical costs for the two facilities. These are furnished as Problem 5.

DESCRIPTION OF ACTIVITIES

In both semesters of the '66 - '67 academic year large sections (some 600 students) viewed the televised portions of a video tape course (Speech 11 - Speaking in Groups) in the theatre classroom, while a control group viewed these materials in typical classrooms (40 stations). In the first semester the theatre facility was equipped with large screen electronic projection. The classrooms were equipped with 21" monitors. In the second semester, for reasons explained below, both groups viewed the lessons on 21" monitors.

In the course of the first semester the preliminary testing procedures completed and direct observations lead to the conclusion that the use of the large screen projector in the theatre situation would, because of its lack of reliability and poor technical qualities, seriously effect the reliability of the results of this study. It was concluded, therefore, that the first semester should be taken as a pilot study and that the research proper be conducted in the second semester with monitors replacing the projector in the theatre facility.

The results reported are those obtained, therefore, on tests and questionnaires developed and validated in the pilot study. A summary of these and the conclusions drawn from the data in the subsequent pages were compiled and are furnished below.

SUMMARY OF CONCLUSIONS

- (1) In the final examination designed to measure specifically the learning of the content of the televised lessons the performance of the classroom groups was significantly superior to the performance of the theatre group. The over-all achievement of the two groups measured in the final grades assigned by the instructors for the course was not significantly different so that it may be said that in this respect the performance of both groups was the same and that large group instruction in this instance was as effective as small group instruction.
- (2) With respect to student preferences, those students normally seated in classrooms preferred the classroom to the theatre facility. Those students normally seated in the theatre preferred the theatre.
- (3) With respect to teacher preferences there was a slight preference on the part of the instructors for the classroom viewing situation which held constant through the pilot and the final study.
- (4) With respect to relative expenditures of faculty resources CCTV and video tape teaching can be done with relatively less involvement and expenditure of faculty resources in an auditorium type facility as opposed to traditional classrooms.
- (5) The technical costs of CCTV and video tape teaching in the theatre type facility were somewhat less than those in the traditional classrooms.

All of these conclusions suggest directions for further investigation. An intriguing question arises in the first and basic conclusions relative to the results in Problem 1. Why did the theatre group, whose performance was significantly less in their test performance overcome this lack to do equally well in over-all final performance in the course?

The other conclusions, being tentative and based on insufficient data, should also be investigated further, particularly, student and teacher attitudes and the relative expenditures of teaching resources in these situations.

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PROBLEM 1 - Joseph Staudacher, Investigator

Student Learning from Televised Materials in Traditional Classrooms Equipped with Monitors Compared with that in a Theatre Facility Similarly Equipped.

Attached are three tables of statistics for the study on effectiveness of conventional classroom vs the theatre facility CCTV instruction. The first page lists the frequency distributions of final examination scores for the two groups separately and for the groups combined. Final examination grades were assigned on the basis of the total distribution. On the second page are two chi-square analysis tables of letter grades, one based on the letter grades assigned to the final examinations scores, and the second based on final letter grades assigned by instructors.

The mean theatre final examination grade was 67.6; the mean classroom grade was 72.8, a difference of 5.2 points. When analyzed by means of the t-test, the difference proves to be significant beyond the 1% level, on a two tailed test. The direction is in favor of the classroom performance. Therefore, the hypothesis of random sampling from a population with a common mean is rejected at better than the 1% level of significance and there is a high degree of probability that the performance of the classroom groups on the final examination is significantly superior to the performance of the theatre group.

When the final examination scores are converted into letter scores and the two groups compared (the first of the chi-square tables), the results are again highly significant at far better than the 1% level. A disproportionate percentage of the A's and B's are obtained by the classroom groups while the theatre group earns a disproportionate percentage of the low grades in the C's, D's, and F's.

A different situation obtains, however, when final class grades are analyzed by the second chi-square table. These are the letter grades assigned by instructors. In this table the chi-square is NOT significant. Thus, the hypothesis of independence of performance from the type of classroom in which instruction is not rejected. It may then be said then insofar as instructor final grades are concerned, the performance of both groups is the same and large-group instruction is as effective as small-group instruction.

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Frequency Distributions of
Final Examination Grades

Score Intervals	Frequency		
	Classroom	Theatre	Total
126 - 130		1	1
121 - 125		0	0
116 - 120		0	0
111 - 115	1	1	2
106 - 110	5	3	8
101 - 105	2	3	7
96 - 100	7	11	18
91 - 95	11	16	27
86 - 90	10	34	44
81 - 85	14	35	49
76 - 80	18	45	63
71 - 75	12	56	68
66 - 70	16	54	70
61 - 65	11	49	60
56 - 60	13	52	65
51 - 55	13	38	51
46 - 50	4	27	31
41 - 45	3	23	26
36 - 40	3	17	20
31 - 35	1	8	9
26 - 30	1	2	3
21 - 25	0	2	2
16 - 20	1		1
N =	146	479	625
Mean =	72.8	67.6	68.8
S.D. =	17.9	16.3	18.4

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Chi-Square Analysis of Final Examination Letter Grades
(Degrees of Freedom = 4)

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>F</u>	<u>TOTAL</u>
Theatre	38	87	201	102	51	479
Classroom	26	33	53	25	9	146
TOTAL	64	120	254	127	60	625

Chi-Square = 16.8 which is significant
at $P < .01$

Chi-Square Analysis of Final Class Grades
(Degrees of Freedom = 3)

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D & F</u>	<u>TOTAL</u>
Theatre	42	179	214	37	472
Classroom	14	63	57	12	146
TOTAL	56	242	271	49	618

Chi-Square - 1.9 which is NOT significant

(Note: it was necessary to combine the D and F categories
because of small expected frequencies in the F category.)

CONCLUSIONS:

(1) In the final examination designed to measure specifically the learning of the content of the televised lessons the performance of the classroom group was significantly superior to the performance of the theatre group.

(2) The over-all achievement of the two groups as measured in the final grades assigned by the instructors was not significantly different, so that it may be said that in this respect, the performance of both groups was the same and that large-group instruction was as effective as small-group instruction.

PROBLEM 2 - Eugene Bierbaum, Investigator

Student Attitudes Toward Learning from Televised Materials in a Theatre Facility Environment Compared with that in Traditional Classroom.

The students involved in this study were:

- (1) 72 students in Speech 11, TV Section #1, seated in the right-hand section of the Varsity Theatre at 11 AM on Thursday morning, ~~and~~.
- (2) 62 students in Speech 11, TV Sections #2 and #3, seated in rooms 100 and 101 of the School of Speech at 11 AM on Thursday morning.

On March 2, 1967, students were given written instructions to change their seating assignments for March 9 only. Students in Section #1 were to report to the School of Speech for seating in rooms 100 and 101; students in Sections #2 and #3 were to report to the Varsity Theatre for seating the first ten rows on the right-hand section of the theatre.

On March 9, 1967, the students viewed the first half of Mr. Hemmer's TV debate lecture in their reversed seating assignments. On March 16, 1967, the students viewed the second half of Mr. Hemmer's TV debate lecture in their originally assigned seats. Thus, the subject matter of the television lectures was held constant, while only the seating assignments were changed.

On March 30, students were asked to fill out the questionnaires. Questionnaires which failed to meet the following three requirements were counted as "invalid":

- (1) Students must have indicated that they were present on both March 9 and March 16 in their assigned places;
- (2) When in the Varsity Theatre, students must have indicated that they were seated in the first ten rows in the right-hand section of the theatre; and,
- (3) Students must have answered Question #5, indicating preference for the Varsity Theatre, the classroom situation, or no opinion.

The results of the tabulations of valid answers to Question #5 are given on the next page. Inferences are stated on the page following.

PROBLEM 2 - Page 3

Tabulation of answers to question #5 on questionnaire distributed to students seated in rooms 100 and 101 of the School of Speech on March 30, 1967.

- 8 (16.7%) Prefer Varsity Theatre.
- 34 (70.8%) Prefer classroom.
- 6 (12.5%) No opinion.

CONCLUSION: Of those students normally seated in the classrooms, a majority preferred the classroom setting instead of the Varsity Theatre.

Tabulation of answers to question #5 on the questionnaire distributed to students seated in the right-hand section of the Varsity Theatre on March 30, 1967.

- 29 (46.8%) Prefer Varsity Theatre.
- 26 (41.9%) Prefer classroom.
- 7 (11.3%) No opinion.

CONCLUSION: Of those students normally seated in the Varsity Theatre, plurality preferred the Varsity Theatre.

INFERENCES:

(1) Students probably tend to favor the physical surroundings for learning to which they have become accustomed. The fact that students tend to become less attached to the theatre situation may be explained by the uniqueness of the situation for learning purposes.

(2) The following explanations may be offered concerning the preference of the classroom setting among students normally assigned to the classroom:

a. Since the classroom setting is "normal" for learning, long years of pre-conditioning may be operative in causing students to prefer the classroom.

b. The cohesiveness of small groups may be a factor. The students may feel themselves a part of a group in the small classroom, whereas it is difficult to identify with the much larger and more impersonal situation in the Varsity Theatre.

c. Attachment to the individual instructor may be a factor. A single instructor is consistently assigned to the small classroom, whereas a group of instructors collectively proctor the Varsity Theatre.

CONCLUSIONS:

There appears to be no strong or significant preference of students for either learning situation. More of those students regularly assigned to the theatre came to prefer it.

PROBLEM 3 - Robert Kennedy, Investigator

Teacher Attitudes Toward CCTV Video Tape Teaching in Traditional Classrooms Compared with those Attitudes Toward Similar Teaching in a Theatre Type Facility.

Of the ten (10) instructors who monitored CCTV in both the theatre and the classroom, the conclusions are as follows:

In the area of student discipline, 60% of the instructors rated the theatre either "excellent", "good", or "satisfactory" while 70% rated the classroom the same. 40% rated the theatre "unsatisfactory" or "poor", 30% rated the classroom "unsatisfactory" or "poor". A ten per cent (10%) preference for the classroom is indicated.

Student attention to lecture results in 60% rating the theatre as "good" or "satisfactory", 40% rating the theatre as "poor". 70% rated the classroom as "good" or "satisfactory", 30% rated the classroom as "unsatisfactory" or "poor". A ten per cent (10%) preference for the classroom is indicated.

Of the two (2) instructors who monitored CCTV in the theatre only, the results are:

100% rated the theatre as "excellent" or "good" in the area of student discipline.

100% rated the theatre as "excellent" or "satisfactory" in the area of student attention to lecture.

50% rated the theatre "good", 50% rated the theatre "poor" in the area of student notetaking.

CONCLUSIONS:

Of the ten instructors who monitored CCTV in both the theatre and the classroom, a ten per cent preference is indicated for the classroom in all three areas.

Of the two instructors who monitored CCTV in the theatre only, 100% rated the theatre as "satisfactory" or better in all areas except student notetaking in which 50% rated "good", 50% rated "poor".

The greatest area of difference between theatre and classroom (as was the case in the pilot study) is in the realm of student notetaking.

In response to the question, "In your opinion do student attitudes vary in their preference for CCTV in a classroom situation as opposed to a theatre situation?"

Of the ten instructors who had monitored CCTV in both the classroom and theatre, six responded YES (60%), four responded NO or DON'T KNOW (40%).

Those who answered YES were asked what per cent they would attribute as those who prefer theatre or classroom.

Two or (33%)	rated the theatre	01%	--- classroom	99%
One or (17%)	rated the theatre	02%	--- classroom	98%
One or (17%)	rated the theatre	15%	--- classroom	85%
One or (17%)	rated the theatre	40%	--- classroom	60%
One or (17%)	rated the theatre	60%	--- classroom	40%

Of the two instructors who monitored the CCTV in the theatre only, 100% responded NO or DON'T KNOW.

CONCLUSIONS:

While the response to this question seems to favor student preference for the classroom, (83% felt students preferred the classroom), the ratio is somewhat less than that indicated in the pilot study.

Instructors who believe a difference in attitude exists tend to believe it overwhelmingly favors the classroom.

In response to question IV, "All things being considered, as Speech 11 Instructor, which do you prefer on the basis of all-over merit?"

Of the ten instructors who monitored CCTV in both the theatre and classroom:

One Instructor (10%)	preferred the theatre
Six Instructors (60%)	preferred the classroom
Three " " (30%)	indicated "No Appreciable Difference."

Of the two instructors who monitored CCTV in theatre only, both or (100%) indicated "No Appreciable Difference".

CONCLUSIONS:

Those instructors who monitored CCTV in both theatre and classroom favor the classroom by a margin of six to four.

A significant number of instructors (five out of twelve) see no appreciable difference between theatre and classroom.

GENERAL CONCLUSIONS:

Instructors prefer the classroom viewing situation to the theatre viewing by a margin of about 10%. This figure held constant throughout an evaluation of all areas considered.

The theatre had fared better in the final study as opposed to the pilot study. In the pilot, instructors favored the classroom over the theatre by a margin of two to one.

Student notetaking remains the area of greatest difference between theatre and classroom. However, it received the poorest rating in both theatre and classroom.

83% of the instructors believe that students prefer the classroom to the theatre. They differ widely however, in rating the degree of preference.

Instructors favor the classroom over the theatre on the basis of over-all merit by a margin of six to four. (those who monitored in both situations)

Five of the twelve instructors who responded to the questionnaire see no appreciable difference between theatre viewing and classroom viewing in over-all merit.

PROBLEM 4 - Professor James Siettmann, Investigator

The Relative Involvement and Expenditure of Faculty Resources for CCTV and Video Tape Teaching in Traditional Classrooms Compared with that in an Auditorium-Type Facility.

The 694 students enrolled in Speech 11 were divided at registration into six sections for the viewing of the TV Lectures. Three of these sections, two in classrooms and one in the theatre met for one hour a week, and the other three sections met at another hour during the week. Both met on the same day, one at 11:00 AM and the other 1:00 PM. This necessitated two showings of each video tape TV Lecture thus involving the equipment and the personnel needed to operate it and all the man-hours that were involved.

The two TV Lectures held at the theatre were viewed on four TV monitors mounted across the front of the theatre. The other four lectures were held in conventional classrooms. Two of these sections met in a room equipped with 2 monitors, and two met in a room equipped with one monitor.

TV Lecture #1--Theatre	(with four TV monitors)	312 students
TV Lecture #2--Classroom	(with two TV monitors)	38 students
TV Lecture #3--Classroom	(with one TV monitor)	38 students
TV Lecture #4--Theatre	(with four TV monitors)	224 students
TV Lecture #5--Classroom	(with two TV monitors)	42 students
TV Lecture #6--Classroom	(with one TV monitor)	40 students

TOTAL	694 students
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The four TV Lectures in the classrooms were monitored by one instructor each for a total of four man-hours per week.

One TV Lecture in the theatre (#1) was monitored by four instructors with another acting as supervisor for a total of five man-hours per week.

One TV Lecture in the theatre (#4) was monitored by three instructors with another acting as supervisor for a total of four man-hours per week.

One instructor acted as an over-all coordinator for a total of one man-hour per week.

The resulting total was an expenditure of 14 class hours (man hours) per week in the supervision of the TV Lecture sections. This supervision included the taking of class attendance at each session. It did NOT include the time spent by each of the six monitors in charge of each section in tabulating, recording, and the reporting of student absences to the instructors of the various Speaking sections. This time varied with the size and absences in a given TV Lecture section, but must be considered in the over-all expenditure of time.

The four instructors monitored a total of 154 students in the four classrooms. This was an average of 38.5 students per instructor.

In one theatre TV Lecture (#1) five instructors monitored a total of 304 students. This was an average of 60.8 students per instructor.

In the other theatre TV Lecture (#4) four instructors monitored 220 students. This was an average of 55 students per instructor.

Speaking Sections: Classrooms

There were 14 instructors involved in teaching the 47 sections of Speech 11. These sections containing the 678 students ranged in size from 10 to 17 with an average of 14.43 students per section. The breakdown of students per Speaking section is as follows:

2 Speaking sections had 10 students for a total of	20
3 Speaking sections had 12 students for a total of	36
3 Speaking sections had 13 students for a total of	39
10 Speaking sections had 14 students for a total of	140
7 Speaking sections had 15 students for a total of	105
20 Speaking sections had 16 students for a total of	320
<u>2 Speaking sections had 17 students for a total of</u>	<u>34</u>

47

TOTALS

694

The breakdown of instructors involved in teaching these 47 sections involving 694 students is as follows:

3 instructors had 1 section for a total of	3
3 instructors had 2 sections for a total of	6
2 instructors had 3 sections for a total of	6
3 instructors had 4 sections for a total of	12
1 instructor had 6 sections for a total of	6
<u>2 instructors had 7 sections for a total of</u>	<u>14</u>

14

TOTALS

47

Thus, with a total of 47 Speaking sections being taught by 14 instructors it meant that each instructor had an average of 3.36 classes.

Findings

For a total of 694 students enrolled in Speech 11 it required 47 man-hours of monitoring for a total of 61 classroom hours. A further note of faculty expenditure of time (classroom hours) according to rank is as follows:

Classroom hours for Speaking sections:

	<u>Hours</u>	<u>per cent</u>
Graduate Assistants	17	36.2
Assistant Instructor	4	8.5
Instructors	16	34.0
Assistant Professors	8	17.0
Associate Professors	2	4.3
	<u>47</u>	<u>100.0</u>

Classroom hours for TV Lectures:

	<u>Hours</u>	<u>per cent</u>
Graduate Assistants	5	35.7
Assistant Instructor	1	7.1
Instructors	4	28.6
Assistant Professors	3	21.5
Associate Professor	1	7.1
	<u>14</u>	<u>100.0</u>

Total classroom hours expended by faculty:

	<u>Hours</u>	<u>per cent</u>
Graduate Assistants	22	36.1
Assistant Instructor	5	8.2
Instructors	20	32.7
Assistant Professors	11	18.0
Associate Professor	3	5.0
	<u>61</u>	<u>100.0</u>

CONCLUSIONS:

CCTV and Video Tape teaching can be done with relatively less involvement and expenditure of faculty resources in an auditorium type facility opposed to traditional classrooms.

PROBLEM 5 - Raymond Bedwell, Investigator

Comparative Technical Costs and Dependability of Closed Circuit Television in Video Tape Teaching by both Large Screen Projection and Standard Monitors in the Theatre-type Facility and Traditional Classrooms Equipped with Standard Monitors.

The study is to compare technical costs involved in operating closed-circuit equipment.

Limitation:

The course used for this comparative study is Speech 11 - Speech in Groups offered during the school year 1966-67 at Marquette University.

During Semester I of that year the original research utilized classrooms in the School of Speech building at the University and large screen projection equipment in a nearby rented motion picture theatre facility used by the University. However, the course was offered throughout the semester in these two facilities, it was determined by the Project Director that feasibility and the dependability of the projection equipment in the theatre was such that a meaningful comparative study could not be made. This conclusion was based largely on the fact that projection equipment uses a 21 inch television picture and magnifies it to a 108 square foot size picture without increasing resolution and with some decrease in brightness. Technical limitations of the equipment made it susceptible to breakdown and television distribution lines from the television tape recorder at point of origination and the theatre were judged unsatisfactory because of spurious electrical interference. On the basis of these technical limitations it was judged advisable to make the comparative study utilizing standard 21 inch television monitors in both the theatre and in classrooms to provide fully legitimate findings for the study.

Findings:

The purpose of this particular phase of the study is to examine the technical costs imposed by the use of television monitors and the additional student stations required in two basic locations. Viewing and audio equipment used in the theatre and classroom location was standardized to the Miratel K-21 V (21 inch diagonal measurement) monitor. In both locations sound amplification was provided by a University speaker and accompanying amplifier. In the theatre location four Miratel K-21 V monitors were used. Three monitors were used in the classroom location.

The viewing sessions employed 311 and 225 student stations respectively. In the School of Speech building, Room 100 (equipped with two of the television monitors) and Room 101 (utilizing one television monitor) were used in the study. Room 100 had been projected as to have a maximum seating for effective television viewing at 47 stations. Room 101 has a maximum efficient seating at 30 stations. During the research period 38 students and 43 students viewed the televised lectures in Speech 100, 37 and 47 students viewed lectures in 101. The number of student stations utilized in Room 101 in both instances exceeded the calculated practical maximum seating determined for these rooms.

The utilization of the theatre location has required the hiring of a technician as well as utilization of the University's Buildings and Grounds Department for moving. Student technician (at \$1.50 an hour) submits a figure of \$2.00 per televised lecture. Buildings and Grounds figure is estimated at \$3.50 televised hour.

University officials have no calculated figure for the cost of operating existing classrooms in the School of Speech building. Consequently, such data cannot be included in this study. The University rents theatre facilities in the Varsity Theatre at a rate of \$28.00 per teaching hour.

The University television facility has established a playback charge of \$10.00 per hour for use of this television recording equipment. This includes depreciation of equipment as well as wear on head wheels. Such cost would be the same in both classroom and theatre. Pro-rated hourly charge for a technician is \$3.85 per hour rated at two service hours for each televised lecture.

Electrical power drawn per monitor is 345 watts maximum per hour. At an electric company supplied rate of \$.0275/KWH of use, this figures to be approximately \$.01 per televised monitor hour. Additional allowance is made for warm-up and maintenance.

Reception equipment cost (monitors and sound equipment) are pro-rated values based on existing rental figures of \$5.00 per day (eight hours).

Distribution costs are the cost of materials and labor for installation, pro-rated over an expected ten year life. For classrooms charge base is 40 hours weekly use. For theatre use, base is 28 hours weekly as provided by the rental contract for this facility.

The chart on the following page compares the per-televised hour costs of presenting this course in two classrooms and in the theatre location:

	<u>Classrooms per TV Hour</u>	<u>Theatre per TV Hour</u>
Classroom Facilities	--	\$28.00
Technician	--	2.00
Buildings and Grounds	--	3.50
Playback Costs	\$10.00	10.00
Engineer	7.70	7.70
Electrical Power	.03	.04
Technical Equipment	10.00	10.00
Reception Equipment	1.80	2.40
Distribution	.05	1.33
	<u>\$29.58</u>	<u>\$64.97</u>

For the research period, the televised lectures were presented two times weekly for 13 weeks. Thus the comparative costs for the entire project are:

Classroom Presentation

\$769.08

Theatre Presentation

\$1689.22

Average per student technical costs based on enrollment figures in each location, are as follows:

Classroom per-Student Cost (158) Theatre per-Student Cost (536)

Per lecture: \$.187

\$.121

Total Course: 4.866

3.152

CONCLUSIONS:

The technical costs of CCTV and Video Tape teaching in the theatre type facility were slightly less than those in the traditional classrooms.